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GREENBLUM & BERNSTEIN, P.L.C.		
1950 ROLAND CLARK DRIVE		
RESTON, VA 20191		

EXAMINER	
KEBEDE, BROOK	

ART UNIT	PAPER NUMBER
2823	

NOTIFICATION DATE	DELIVERY MODE
05/03/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

gbpatent@gbpatent.com
pto@gbpatent.com

Office Action Summary

Application No.

10/711,043

Applicant(s)

CRAWFORD ET AL.

Examiner

Brook Kebede

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-15, 17, 19 and 20 is/are pending in the application.
- 4a) Of the above claim(s) 14, 15, 17, 19 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Election/Restrictions***

1. Applicants' election with traverse of the Group I and Species I invention, claim(s) 2-13, in the reply filed on February 22, 2007, is acknowledged. The traversal is on the ground(s) that "the examiner fails to identify one or two criteria for proper restriction requirement [i.e.,] *an appropriate explanation and serious burden* and [hence] there is no undue or serious burden in concurrent examination of Group I and II..." This is not found persuasive.

A restriction requirement between one set of product claims (i.e., the sub-combination) and a set of process claims (i.e., the combination) was issued in the Office action mailed on January 22, 2007. "Section 121 [of Title 35 USC] permits a restriction for 'independent and distinct inventions,' which the PTO construes to mean that the sets of claims must be drawn to separately patentable inventions." See *Applied Materials Inc. v. Advanced Semiconductor Materials* 40 USPQ2d 1481, 1492 (Fed. Cir 1996)(Archer, C.J., concurring in-part and dissenting in-part). See *In re Taylor*, 149 USPQ 615, 617 (CCPA 1966). "When two sets of claims filed in the same application are patentably distinct or represent independent inventions, the examiner is to issue a restriction requirement." See *In re Berg*, 46 USPQ2d 1226, 1233 n.10 (Fed. Cir. 1998).

The examiner, in issuing a restriction requirement, must demonstrate "one way distinctiveness." *Applied Materials Inc.* at 1492. As stated within the restriction requirement, "inventions are distinct if either or both of the following can be shown: the subcombinations are distinct if they do not overlap in scope and are not obvious variants, and if it is shown that at least one subcombination is separately usable." See MPEP § 806.05(d). In the instant case,

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subcombination Group I has separate utility such as for formation of thin oxide films or nanotubes rather than etchant and that, as a result, a restriction was necessary.

In addition to one way distinctiveness, the examiner must show “why it would be a burden to examine both sets of claims.” *Applied Materials Inc.* at 1492. “A serious burden on the examiner may be *prima facie* shown if the examiner shows by appropriate explanation either separate classification, separate status in the art, or a different field of search.” MPEP 803.

Furthermore, it is discretionary to make restriction requirement at any point of the prosecution of the case prior the prosecution closed as long as the examiner shows distinctiveness and burden.

An explanation was provided in the restriction requirement. Specifically, in addition to being distinct, the examiner indicated that restriction is proper because the product claims (i.e., in the subcombination) and the process claims (i.e., in the combination) “have acquired a separate status in the art.”

Pertaining the species restriction requirement, even though 37 CFR §1.141 provides that a reasonable number of species may still claimed in one application, it is still proper to restrict claims of different species as long as the Examiner shows *prima facie* case of a serious burden and appropriate explanation of separate classification, or separate status in the art, or a different field of search. For instance, the first species directed to the process cleaning of the resist contaminant whereas the second species directed image masking process for formation of vias and trenches. These are mutually exclusive processes and such distinct processes require an independent search from one another which causes a great burden to the Examiner and it acquired different field of search and that, as a result, a restriction was necessary. An explanation was provided in the restriction requirement. Specifically, in addition to being

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burdensome, the examiner indicated that restriction is proper because different species in the claims are required "different field of search."

The criteria of distinctness and burdensomeness have been met, as demonstrated hereinabove. Accordingly, the restriction requirement in this application is still deemed proper and is therefore **made FINAL**.

2. Accordingly, claims 14, 15, 17, 19 and 20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention and species respectively, the requirement having been traversed in the reply filed on February 22, 2007.

Claim Objections

3. Claim 3 is objected to because of the following informalities:

Claim 3 contains improper form of Markush grouping of claims. It is improper to use the term "comprising" instead of "consisting of" See *Ex parte Dotter*, 12 USPQ 382 (Bd. App. 1931). Also See MPEP § 2173.05(h). Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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6. Claims 2-8 are rejected under 35 U.S.C. 102(e) as being anticipated by Hamada et al. (US 2004/0241579 A1).

Re claim 2, Hamada et al. disclose a method of photoresist trimming, comprising the steps of: forming a resist foot (not shown) (i.e., the resist scum that formed during patterning of resist layer 21) (see Fig. 1a and Page 25, Paragraph [0188] through Paragraph [0192]; and removing the resist foot (not shown) found in the trench during a trimming process, wherein the trimming step process comprises ionizing a portion of a mixture of gases comprising O₂ and at least one other oxide gas to form an etchant for the trimming process (see Figs. 1(a) though 2 (2b) and related text in Page 24, Paragraph [0187] through Page 25, Paragraph [0198]).

Re claim 3, as applied to claim 2 above, Hamada et al. disclose all the claimed limitations including wherein the mixture of gases selected form the group consisting of least CO₂, SO₂ and NO₂ formed by mixing during a plasma etching process (see Figs. 1(a) though 2 (2b) and related text in Page 24, Paragraph [0187] through Page 25, Paragraph [0198]).

Re claim 4, as applied to claim 2 above, Hamada et al. disclose all the claimed limitations including wherein the trimming process is performed on a mask and an upper surface of the mask is resistant to etching (see Figs. 9A – 9D and related text in Col. 7, line 38 – Col. 8, line 53).

Re claim 5, as applied to claim 4 above, Hamada et al. disclose all the claimed limitations including polymerizing an upper surface of the mask.

Re claim 6, as applied to claim 3 above, Hamada et al. disclose all the claimed limitations including providing a barrier on an upper surface of the mask derived from an oxide gas.

Re claim 7, as applied to claim 3 above, Hamada et al. disclose all the claimed limitations including arranging a carbon barrier on an upper surface of the mask.

Re claim 8, as applied to claim 4 above, Hamada et al. disclose all the claimed limitations including forming a sidewall in a mask which is to be trimmed during the trimming step-process, and etching a lower portion of the sidewall of the mask using the mixture of gases comprising O₂ and at least one other oxide gas to form the sidewall substantially perpendicular to a surface of the mask.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. **Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamada et al. (US 2004/0241579 A1).**

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Re claims 9-13, as applied to claim 2 in Paragraph 6 above, Hamada et al. disclose all the claimed limitations except the ratio of the gas mixtures and desired pressure of the gas mixtures. Although, Hamada et al. disclose the gas mixtures and at predetermined pressure that used for trimming or the resist layer, the value or various ratios of the gas mixtures and the pressure ranges are not specifically mentioned. However, the ratios of the gas mixtures and the pressure ranges as claimed in the instant application is obvious in view of Hamada et al. disclose because such ratios and pressure ranges can be achieved by routine experimentations in order to achieve the desired etch rate and profile.

Therefore, it would have been to one having ordinary skill in the art at the time of the invention is made to set the gas mixture ratio and pressure range, since it has been held where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” See *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); *In re Kulling*, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and *In re Geisler*, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997). Furthermore, the specification contains no disclosure of either the critical nature of the claimed gas mixture ratio and pressure range or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. See *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d, 1936 (Fed. Cir. 1990).

Response to Arguments

9. Applicants' arguments filed on April 10, 2006 have been fully considered but they are not persuasive.

Applicants argue that "AMADA does not disclose removing the resist foot found in the trench during a trimming process, wherein the trimming process comprises ionizing a portion of a mixture of gases comprising O₂ and at least one other oxide gas to form an etchant for the trimming process..."

In response to applicants' arguments, it is respectfully submitted that the rejected claims, in particular as recited in claim 2, do not require the use of the gas mixture that containing O₂ for removing of the resist foot that is formed in the trench. As clearly recited in claim 1, the use of the gas mixture that contains O₂ gas is used to trim the resist layer that formed the trench foot. No wherein in the rejected claims that mixture that contains O₂ is used to remove the resist foot. Similarly, Hamada et al. '0241579 disclose trimming process of the resist layer 21 using the gas mixture that contains O₂ gas and other gases such as CO₂, SO₂, or NO₂ in order to form resist pattern that resulted a resist scum during the resist development and removing of the resist scum (See Fig. 1(a) and Paragraphs [0187] – [0193]).

Therefore, the rejection of claims 2-8 under 35 U.S.C. § 102(e) is deemed proper. In addition, the *prima facie* case of obviousness has been met and the rejection under 35 U.S.C. § 103(a) is deemed proper.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure Imai et al. (6,057,247) also disclose similar inventive subject matter.

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11. Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

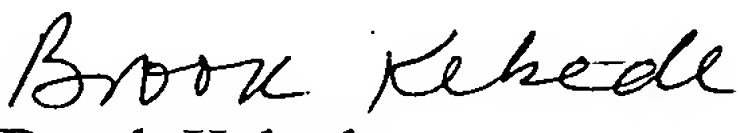
Correspondence

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brook Kebede whose telephone number is (571) 272-1862. The examiner can normally be reached on 8-5 Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Brook Kebede
Primary Examiner
Art Unit 2823

BK
April 28, 2007